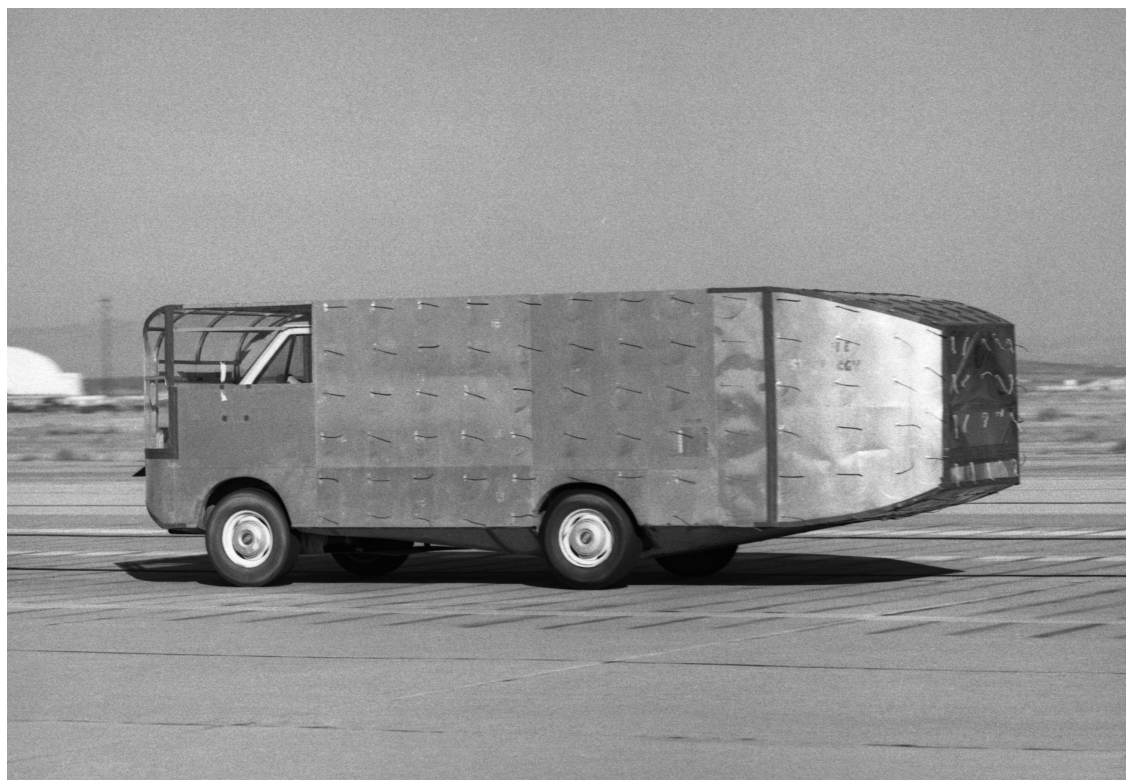


Aerodynamic Truck Studies



This slab-sided aluminum body was mounted over a standard van during research in applying aerodynamic drag reduction techniques to ground vehicles conducted at NASA's Dryden Flight Research Center in the late 1970s and early 1980s. Felt tufts mounted on the sides, top and semi-boat tail rear of the modified body clearly show the airflow over the structure. (NASA photo)

During a decade spanning the 1970s and 1980s, Dryden researchers conducted tests to determine the extent to which adjustments in the shape of trucks reduced aerodynamic drag and improved efficiency. During the investigation of truck aerodynamics, the techniques honed in flight research proved highly applicable.

During the tests, the vehicle's sides were fitted with felt tufts, or strings, that showed airflow. The investigators concluded that rounding the vertical corners front and rear reduced drag by 40 percent, yet decreased the vehicle's internal volume by only 1.3 percent. Rounding both the vertical and horizontal corners cut drag by 54 percent, while losing only three percent of internal volume.

The first phase involved a cab-over tractor-trailer, modified by rounding all of its front corners and edges. In addition, technicians attached sheet metal fairings over the cab's roof and sides as far back as the trailer. This covering closed the open space between the cab and trailer. During the phase one research, researchers found that in highway driving at 55 miles per hour, rounding the corners and fairing the space to close the gap between the truck's cab and trailer resulted in a significant reduction in aerodynamic drag, resulting in 20 to 25 percent lower fuel consumption than the standard vehicle. The improvements soon spurred design changes in production trucks, as many truck manufacturers subsequently incorporated similar modifications on their products.

The second phase conducted on the modified passenger van entailed such modifications as rounding the vertical and horizontal corners, as well as adding a "boat tail" structure to the rear of the vehicle and a faired underbody. The modified van--with rounded vertical corners front and back--experienced 40 percent less drag than the standard configuration. With the rounding of horizontal corners as well, drag reduction rose to 54 percent.

A second group of tests added a faired underbody and a boat tail, the latter feature resulting in an additional drag reduction of about 15 percent.

Based on the research conducted at NASA Dryden, many truck manufacturers subsequently incorporated similar improvements and design modifications in their production trucks.



After leasing a cab-over tractor-trailer from a Southern California firm, Dryden researchers added sheet metal modifications like those shown here. They rounded the front corners and edges, and placed a smooth fairing on the cab's roofs and sides extending back to the trailer. (NASA photo)

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